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## IMPROVING DISASTER RESPONSE TIMES IN AFRICA

**A** marriage between the only two civilian high-power computing centres on the African continent, one in Cape Town, will help improve disaster response times across the continent.

The Kamal Ewida receiving station is a partnership with Egypt's National Authority for Remote Sensing and Space Sciences. The Centre for High Performance Computing, in Cape Town, is the other high-powered computing partner in Africa.

More high-powered computer centres are needed to quickly process masses of data being beamed down by satellites keeping an eye on Africa

Gilbert Rochon of Purdue University in the USA made the announcement at a session on high performance geocomputing at the International Geoscience and Remote Sensing Symposium underway this week in South Africa.

The project will help establish the Kamal Ewida Earth Observatory in Egypt in order to smoothly process bandwidth-hungry satellite data which can be used to monitor for floods, droughts and global warming.

However, Rochon said the receiving station is a vital link in efforts to warn of environmental

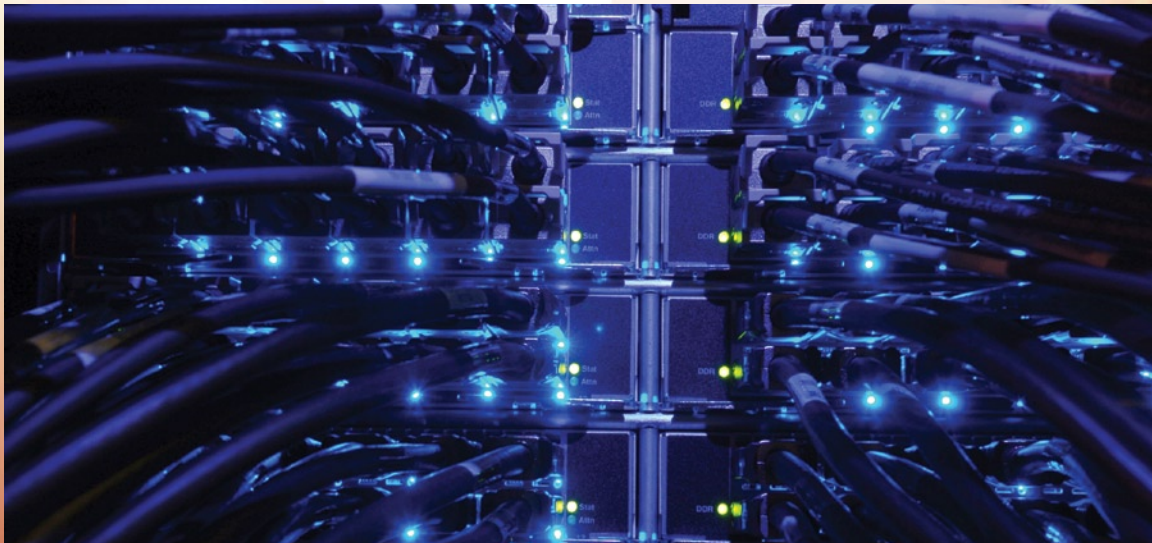
triggers for parasite-borne diseases threatening humans - such malaria, river blindness, sleeping sickness, elephantiasis and leishmaniasis - as well as economically significant diseases such as heartwater, which strikes cattle.

He showed a map indicating that given climate change, many of these diseases are moving out of Asia, Africa and Latin America and may in the future threaten the developed world.

Rochon showed the delegates a map showing computer information flows around the world: "there are these big pipes linking the USA to Europe and Asia, and there are only little spaghetti strings in Africa, mostly to Egypt and South Africa," he noted.

NATO is a strong supporter of the project, although much of the financial support is coming from the Egyptian government.

Other academic contributors go back a long, long way: Egypt's 1020-year-old Al-Azhar University, established in the year 988 AD and the century-old Cairo University. Turkey is also contributing to the project through the Kandili Observatory and Earthquake Research Institute, directed by Prof Gulay Altay in Istanbul.





## Predicting floods and disease

**L**ake Victoria is the second largest fresh water lake in the world. From space it looks like a jewel in the heart of the continent, responsible for the livelihood of over 30 million of people.

This jewel does, however have a darker facet – floods and droughts in the region are responsible for 95% of the natural hazards and 75% of the economic loss in the region.

In 2006, for example, the lake - which covers an area of 68 870 km<sup>2</sup> and produces a gross domestic product of US\$30-billion a year – experienced floods which displaced 850 000 people and caused the loss of property valued at US\$400-million.

But, thanks to a groundbreaking programme, future flooding may have a far less devastating effect.

NASA's Applied Science programme has partnered with USAID and The Regional Centre for Mapping of Resources for Development (RCMRD) in Kenya to implement an operational flood

warning system for East Africa, using satellite and remote sensing information as well as ground-based observation. The aim of the project is to produce a close to real time, online flood early warning system as well as Rift Valley fever health risk maps for the countries that share the lake's shoreline: Kenya, Uganda and Tanzania.

One of the satellites that is being used in the project is the NASA TRIMM 3b42 satellite which is able to provide an estimation of expected depth of flooding as well as potential precipitation.

The precipitation and temperature data also used to indicate areas which have potential for the mosquito-borne Rift Valley Fever.

The project will run for three years, with the system coming fully online in 2010. One of the aims of the project is also to build the capacity of institutions on a regional scale so that there is no need for a break in continuity after the initial project is completed.

## PRECIOUS RESOURCE

**I**f all the water on Earth could be put into a four-litre bottle, the readily-available quantity for use by people would be about one tablespoon, or less than half of one per cent of the total. Nevertheless, even this small amount is deemed sufficient to meet all the present and foreseeable people's needs – if it were evenly distributed around the world and protected from degradation.

- UNEP





# FIRE AND WATER

**A**merican geographer Kelley Crews, who has been based in the southern African nation of Botswana for three years, says fire is a tricky thing to capture by satellite.

The inland floodplain known as the Okavanga Delta, where she works, "is one of the most fragmented landscapes I've ever worked in – wet versus dry, reserve versus open access and so on," says Crews.

"We have very frequent fires but they're relatively small compared to other African savannahs; a lot of the landscape burns but not all at the same time. And the landscape has a very quick recovery: even two weeks later, there can be enough biomass that it can move the signal."

Crews' research – part of a larger two decade effort by an international research team to investigate the varied sources of land disturbance – was thus "very complicated."

Interviews with 250 people revealed that nobody had ever seen a lightning strikes trigger a fire, she says, although three interviewees said they had heard of it. So lightning has been ruled out as a significant cause of fires.

Professional hunters regularly use controlled fires to improve viewing and hunting opportunities for their section of the tourist market, she said.

Poachers also find it easier to track game in

charred soil. "Perhaps the biggest cause of fires is poaching and they're also the biggest cause of fires that get out of control."

"Land can be disturbed by climate change; it is also disturbed by the human impact of ranching and poaching. We have good ways of tracking climate change. We also have good ways of tracking human management of land. What we don't have is something that does both – and the problem is that they both happen at the same time."

A Danish ecological geographer, Rasmus Fensholt, spoke at the same session at the International Geoscience and Remote Sensing Symposium, underway this week in South Africa, on decades of satellite data covering the Sahel.

Zooming in to show differences between rangeland and agriculture, the University of Copenhagen researcher said the maps showed the impact of humanity rather than climate change, as "rainfall cannot explain these different patterns."

While it might be possible to use earth observation trend maps effectively to manage the true Sahel, further south other human-driven factors such as cutting down woody vegetation and farming that depleted soil nutrients meant that researchers should be "careful," he said.



# An eruption of knowledge

**V**olcanoes span the world. So, too, do the network of satellites keeping an eye on the volcanoes. And now, there is a global network of researchers: Globvolcano.

Globvolcano, currently based at 15 sites and using seven processing centres, can provide "early warning of volcano risk," Fabrizio Novali from Tele-Rilevamento Europa told the audience at the International Geoscience and Remote Sensing Symposium underway this week in Cape Town, South Africa.

"Using satellites to monitor volcanoes means there is no need to access dangerous areas," explained Novali in another session on the use of the InSAR (Interferometric Special Aperture Radar) to constantly record the signal of beams being bounced off the earth. "Satellites can see through ash plumes and clouds,

they can update regularly and they can cover large areas."

However, he noted, "loss of coherence" and "atmospheric noise affects the precision of our estimate of volcanic motion."

TRE used visuals of Mt Etna in Italy and the Piton de la Fournaise volcano in the Indian Ocean island of Réunion to show how turbulence in the atmosphere could negatively affect satellite data, but Novali said that InSar datastacks are "very important tools" and had considerable potential for volcano monitoring once the atmospheric component had been removed.

The tried-and-tested Earth Observatory Grid Processing on Demand (G-POD), done by the European Space Agency, was available to help researchers, according to Miguel Angel Rubio of the University of Granada in Spain.

He quoted another researcher at the conference who complained that it took him six months to download data from a satellite, when G-POD did it in a week.

"No expertise is required," Rubio noted. However, G-POD will only be online again at the end of September. It is going offline for a refurbishment, so it can increase the number of volcanoes monitored. "Move the code, not the data," he told researchers.

Annamaria Vicari of Italy's Istituto Nazionale di Geofisica e Vulcanologia used the explosion of Mount Etna last year to indicate that a variable threshold, as opposed to a fixed threshold, improved the quality of the data.

Etna, which was monitored by MODIS and AVHRR, helped show the potential of almost-real-time forecasting of the path that the lava would flow, she said.



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